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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,350	07/14/2005	Kari Sundman	991.1203	3051

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EXAMINER

KINNEY, ANNA L

ART UNIT	PAPER NUMBER
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1731

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/519,350

Applicant(s)

SUNDMAN ET AL.

Examiner

Anna Kinney

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/4/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitations "the evaporation plant" in line 3 of the claim, "the coke" in line 5 of the claim, and "the sulphur compounds" in line 8 of the claim. There is insufficient antecedent basis for these limitations in the claim. No reference to these limitations is provided earlier in the claim.

Claim 5 recites the limitation "the product gases" in both lines of the claim. There is insufficient antecedent basis for this limitation in the claim. No product gases were recited in claim 1.

Claim 6 recites the limitations "the evaporation plant" in line 3 of the claim and "the coke" in line 5 of the claim. There is insufficient antecedent basis for these limitations in the claim. No reference to these limitations is provided earlier in the claim.

Claim Rejections - 35 USC § 103

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brink et al (U.S. 3,639,111) in view of Hess et al (U.S. 3,607,619).

With respect to claim 1, Brink discloses a method for treatment of spent black liquor (col. 1, lines 54-61), in order to recover its contents of chemicals (col. 4, lines 18-

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28) and energy (col. 1, lines 54-61), wherein a spent liquor flow arriving from the evaporation plant (col. 5, lines 54-62) is taken to a pyrolysis reactor, wherein it is pyrolysed at a temperature of about 400°C to 750°C (col. 3, lines 3-12), which contains 2 specific points within the claimed range of 300-800°C, and the coke (i.e., "solid residue"; col. 3, lines 5-8) is taken to a gasification reactor for gasification (i.e., "cracking"; col. 3, lines 24-37), which gasification is implemented under such conditions that the sulphur compounds contained in the coke and deriving from the cooking chemicals are reduced to sodium sulphide (col. 2, lines 26-38). The Examiner construes Brink's lack of discussion of adding oxygen in the first zone to mean that the pyrolysis in the first zone occurs in the absence of an external gas component. Brink does not suggest introducing oxygen until the temperature is to be increased to the 800-1200°C range (i.e., gasification) which occurs in the second zone (col. 3, lines 24-37). At the time of the invention, it would have been obvious to a person of ordinary skill in the art that since the black liquor is derived from the kraft process in the pulping of wood (col. 2, lines 26-32), this process would occur at a pulp mill.

Brink does not disclose expressly that the evaporable compounds are recovered before gasification.

Hess discloses a method for treatment of spent black liquor at a pulp mill (Abstract) wherein a spent liquor flow arriving from the evaporation plant (Detailed Description, ¶ 10) is taken to a pyrolysis reactor (Detailed Description, ¶ 4), wherein it is pyrolysed at a temperature of 450-700°F (converts to 232-371°C; Abstract), which contains 1 specific point (371) within the claimed range of 300-800°C, in the absence of

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an external gas component (Abstract) in order to separate evaporable compounds from the coke remaining in a solid state, whereupon the evaporable compounds (12) are recovered (Detailed Description ¶ 4), and the coke is burned to supply heat and to recover chemicals (Detailed Description ¶ 8).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to recover gases produced by pyrolysis as described by Hess in the pyrolysis and gasification process of Brink to obtain the invention as specified in claim 1.

The motivation would have been that the gaseous products of the process contain a substantial amount of dimethyl sulfide which may be recovered as a valuable by-product of the process (Detailed Description ¶ 6).

With respect to claim 3, Brink discloses that the evaporable compounds separated from the spent liquor in the pyrolysis reactor are transferred to the gasification zone (col. 3, lines 5-8) and then are used at the mill as fuel (col. 4, lines 42-47).

With respect to claim 4, Hess discloses that the evaporable compounds separated from the spent liquor in the pyrolysis reactor are processed further (Detailed Description, ¶ 14).

With respect to claim 5, Brink discloses that the product gases resulting from the gasification are used at the mill as fuel (col. 4, lines 42-47).

With respect to claim 8, Hess discloses that the pyrolysis reactor is for a continuous process (col. 2, lines 64-67).

With respect to claim 7, Hess discloses that the reactor may be operated continuously (col. 2, lines 64-67), but does not require continuous operation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art that batch operation is also appropriate for this process. It would have been further obvious, in absence of evidence to the contrary, that one of ordinary skill in the pyrolysis art would know what products would result at various temperature ranges and would select a temperature range to produce the product desired.

With respect to claim 9, Hess discloses that the pyrolysis is carried out in such process conditions (Brief Summary ¶ 8) wherein the Examiner construes that the evaporable compounds mainly consist of non-condensing gases (Detailed Description ¶ 13 & Table III), considering that Hess does not discuss any other evaporable compounds.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brink and Hess as applied to claim 1 above, and further in view of Dehaas (U.S. 4,135,968).

With respect to claim 2, Brink and Hess do not disclose expressly that part of the liquor is burnt in a soda recovery boiler.

Dehaas discloses that a part of the spent liquor flow arriving from the evaporation plant is taken to the pyrolysis reactor (col. 5, lines 24-28), whereas a second part of the spent liquor flow is taken to a soda recovery boiler (col. 5, lines 22-23) where it is burnt in order to recover its contents of chemicals and energy (col. 1, lines 33-34).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to divide concentrated spent liquor for treatment by pyrolysis or by burning

in a recovery boiler as described by Dehaas in the pyrolysis and gasification process of Brink and Hess to obtain the invention as specified in claim 2.

The motivation would have been to enable an increase in capacity and an improvement in efficiency of the boiler and effect a great reduction in the amount of particulate matter and odorous gases being carried away in flue gas (col. 3, lines 39-47).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brink and Hess as applied to claim 1 above, and further in view of Purdy et al (U.S. 4,497,637) and Hermescec et al (U.S. 6,596,908).

With respect to claim 10, Brink and Hess do not disclose expressly producing pyrolysis oil. However, Brink discloses that the process is adapted to various organic wastes comprising wood, bark, agricultural residues, and municipal sanitary and solid wastes including garbage (i.e., biomass), in addition to kraft black liquor (col. 1, lines 67-75).

Purdy discloses a method of pyrolyzing a biomass with inert gases, producing char, pyrolysis oil, and pyrolysis gas, and gasifying the char (Abstract) at a temperature of 900-1600°F (converts to 482-871°C; col. 5, lines 25-28), which contains one specific point within the claimed range of 300-800°C. Purdy does not disclose expressly that pyrolysis oil is the main constituent of the evaporable compounds.

Hermescec discloses a method of pyrolyzing lignocellulosic material (col. 1, lines 14-18), discloses that the relative product yield depends on process parameters (col. 1, lines 22-26), and that pyrolysis oil is the major product (i.e., the evaporable compounds

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mainly consist of pyrolysis oil) at temperatures between 350 and 600°C (col. 2, lines 4-6).

Brink, Hess, Purdy and Hermescec are analogous art because they are all directed to a similar problem solving area, that of pyrolyzing lignin-containing materials.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to expect pyrolysis gas production as described by Purdy and Hermescec in the pyrolysis and gasification process of Brink and Hess to obtain the invention as specified in claim 10.

The motivation would have been that the gas phase is the dominant pyrolysis product at temperatures in excess of 800°C (Hermescec, col. 1, line 66 – col. 2, line 1), which exceeds the claimed temperature range.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tournier et al (U.S. 4,511,433) in view of Hawley (Gessner G. Hawley, The Condensed Chemical Dictionary, Tenth Edition, Van Nostrand Reinhold Co., 1981).

With respect to claim 6, Tournier discloses a Method for treatment of spent liquor in which cooking is carried out with an organic solvent in order to recover its contents of chemicals (Abstract) and energy (col. 8, lines 46-53), wherein the spent liquor flow arriving from distillation (which the Examiner considers to be equivalent to an evaporation plant) is taken to a pyrolysis reactor (col. 8, lines 46-53), wherein it is pyrolysed at a temperature of 450°C (col. 12, lines 2-8), which contains 1 specific point within the claimed range of 300-800°C, under nitrogen (col. 12, lines 2-8), which the Examiner considers to be in the absence of an external gas component, in order to

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separate evaporable compounds from the coke remaining in a solid state (col. 12, lines 2-14), whereupon the evaporable compounds are recovered and used at the mill as process chemicals (col. 19, lines 17-19), and the coke is taken to combustion equipment for burning (col. 8, lines 46-53). At the time of the invention, it would have been obvious to a person of ordinary skill in the art that since the spent liquor is derived from the delignification of wood (col. 18, lines 53-57), this process would occur at a pulp mill.

Tournier does not disclose expressly that the phenolic compounds recovered were recovered from the evaporable compounds fraction remaining after pyrolysis. However, Tournier does disclose that the pyrolysis occurred at 450°C (col. 12, lines 2-8), which is higher than the boiling point of even high-boiling phenols as evidenced by Hawley (pg. 796, "phenol" entry). Therefore, the Examiner considers that the phenols from pyrolysis were evaporable at the high temperatures of pyrolysis.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply a boiling point range for phenols as described by Hawley in the delignification and pyrolysis method of Tournier to obtain the invention as specified in claim 6.

The motivation would have been that high-boiling phenols are used as solvents (col. 2, lines 18-23).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. 6,030,493, is the U.S. equivalent of WO 96/14468, which

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was cited on an international search report along with U.S. 5,174,860. U.S. '493 shows spent liquor gasified in at least two reactors, and U.S. '860 shows pyrolysis of black liquor at 600°C or lower, followed by combustion of the resulting char and gases. In the Examiner's opinion, these references did not provide a stronger basis for rejection than those references used in the rejections above. U.S. 5,211,002 shows gasification for recovery of energy and chemicals in a sulphate process, and U.S. 5,370,771 show chemical and energy recovery by thermal decomposition of spent liquor at a temperature of 500-1500°C with or without oxygen supply.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Kinney whose telephone number is (571) 272-8388. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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